Loop 202/US 60
TRAFFIC INTERCHANGE

Final Noise Study Technical Report Update

Prepared for:

ADOT

Arizona Department of Transportation
Intermodal Transportation Division
Roadway Engineering Group

November 2004

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

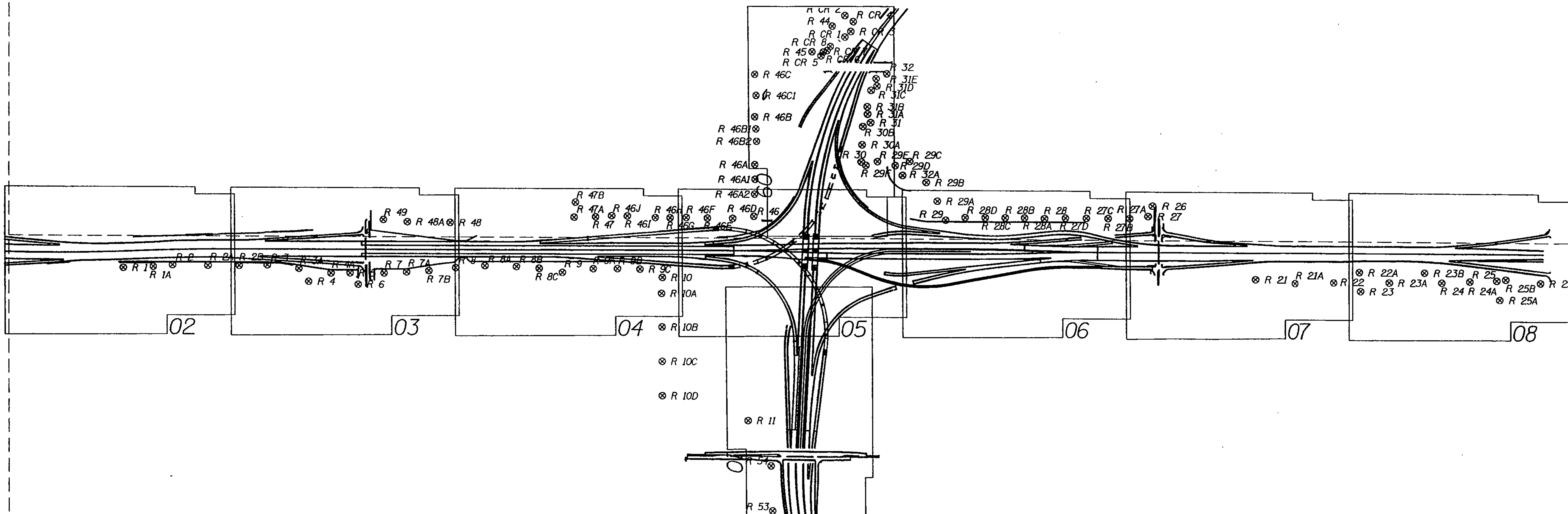
1.0 INTRODUCTION

This report provides the results of the traffic noise analysis effort that identifies areas where potential noise impacts are anticipated and where traffic noise mitigation measures will be provided as part of the final design and construction of the highway improvements. This report is an update to the Final Noise Study Technical Report; 202L/US60 Traffic Interchange prepared by Entranco, Inc. dated May 2001.

Barrier locations and heights have been analyzed for noise attenuation in accordance with 23 USC Section 109(h) and (i), of the Federal Highway Administration guidelines for the assessment of highway traffic-generated noise. These regulations, published as Part 772 of Title 23 of the Code of Federal Regulations, provide procedures to be followed in conducting noise analyses that will protect the public health and welfare. Additionally, this analysis was performed in accordance with the Arizona Department of Transportation's (ADOT's) "Noise Abatement Policy", dated March 9, 2000 and all subsequent updates.

The 202L/US60 fully directional freeway-to-freeway traffic interchange is located in the City of Mesa and unincorporated areas within Maricopa County **(Figure 1 - Project Location)**. The project includes widening existing US60 between Power Road and Crismon Road from 3 lanes in each direction to 5 or 6 lanes plus provisions for a future HOV lane in each direction; constructing 3 or 4 lanes in each direction of the 202L from Baseline Road to Southern Avenue; and the traffic interchange between, including directional ramps and bridges. The design and construction has been divided into two phases. Asphalt rubber-asphaltic concrete (ARAC) will be applied to the roadways, ramps and bridges at the end of construction. The project length is approximately 4 miles on US60 and 1 mile on 202L.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				



	NAME	DATE
DESIGN		
DRAWN		
CHECKED		

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

Project Location

ROUTE | LOCATION

DWG NO.

____ OF ____

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

2.0 GENERAL DESCRIPTION OF NOISE MODELING AND ABATEMENT MEASURES

2.1 Criteria for Determining Noise Barriers

ADOT has provided noise mitigation on new highways and highway reconstruction projects since 1972. Many of these projects have involved federal funds, and the Federal Highway Administration (FHWA) has issued regulations for noise evaluation in 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. These criteria were utilized to determine if noise mitigation is warranted. Table 1 reproduces the federal criteria:

TABLE 1

FHWA NOISE ABATEMENT CRITERIA (NAC)

Activity Category	Noise Abatement Criteria LEQ (dBA)	Description of Activity Category
A (Exterior)	57	Tracts of land where serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particularly parks or portions of parks, open spaces, or historic districts, which are recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B (Exterior)	67	Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A, residences, motels, hotels, schools, churches, libraries, and hospitals.
C (Exterior)	72	Developed lands, properties or activities not included in Categories A or B above.
D	-	Undeveloped lands
E (Interior)	52	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

In general, FHWA Criteria for Noise Abatement identify categories of land uses and activities (A through E) and then specify a maximum noise level for that type of use and activity. In the case of parks, schools, churches and homes, the criteria establish a category B and state that noise levels should not approach 67 LEQ (dBA). ADOT Noise Policy defines "approach" as being 3 LEQ (dBA) below the noise abatement criteria, therefore noise abatement will be considered for areas that equal or exceed 64 LEQ (dBA). Noise abatement will also be considered when the predicted traffic noise level substantially exceeds the existing noise level. A substantial increase is considered to be 15 dBA or greater.

2.2 Data Sources and Assumptions

For the purposes of this noise analysis, FHWA criteria have been used, except where superseded by ADOT policy. FHWA criteria specify that traffic conditions used generate the noisiest predictions, shall be computed for the design year (for this project, design year 2025) and that a specific model be utilized for the calculations. The FHWA-approved highway noise computer model STAMINA 2.0/OPTIMA was used for all noise computations.

Traffic volumes were based on year 2025 Level of Service C predictions computed by the HCM software, using the traffic data developed by DMJM Harris in their Traffic Report for 202L/US60 System Traffic Interchange, Phase II (Stage II Design) dated August 2002. The LOS C volumes are included in Appendix A. The exact horizontal and vertical geometry of the roadways utilized in this report were obtained from AZTEC's Phase I final design plan & Phase II 60% design plans.

Other general assumptions included the following:

<u>Traffic Speed</u>

Mainline Speed:	70 mph
Directional Ramp Speed:	55 mph
Interchange Ramp Speed:	50 mph
Cross Road Speed:	45 mph

<u>Traffic Mix</u>	95% Passenger Vehicles
	3% Medium Trucks
	2% Heavy Trucks

Ground Effects on Noise Propagation (Alpha Factors): Hard ground propagation rates of 3.0 dBA drop-off per doubling of distance were used to represent attenuation over a hard surface between roadway and neighbor.

Shielding Effects: There were no existing obstructions, buildings or features that would shield the neighbors from the project except for the depressed earthen berms of the project. These were modeled as barriers.

Sensitive Noise Neighborhood Locations: Neighborhoods modeled at 28 locations as identified in Table 3 were based on the Noise Study Technical Report dated May 2001. Seventy-four additional homes and neighborhoods were added to the model to adequately predict the future noise impact for the neighborhoods in the project area and were selected based upon existing development. Each of these model locations was field verified to ensure they are representative of the outdoor area of common use for each sensitive neighbor located near the project limits. The neighbors were identified as points with an elevation five feet above existing ground. The Augusta Casitas neighborhood was added because the date of building permit was before the date of the EA signing, although they were not initially included in the previous report.

2.3 Stamina 2.0/Optima Modeling

The FHWA-approved noise prediction computer model STAMINA 2.0/OPTIMA was used for noise computations. The model translated the highway into a series of endpoints on a three-dimensional X, Y, Z coordinate system. Mainline roadways, ramps and cross streets were defined by these endpoints and traffic volumes were assigned to each of the roadways under study. Correspondingly, barriers to noise such as slopes, retaining walls and changes in topography were modeled as vertical planes. Neighbors were identified as points with an elevation of 5 feet above grade.

At the Noise Analysis Brainstorming meeting held on February 12, 2003, ADOT expanded and clarified its position on using an asphaltic concrete friction course, asphalt rubber (AR-ACFC) surface course to obtain a 4 dBA noise level reduction. Therefore, a new reference emission monitoring level (REML) for quiet pavement was developed for the model interface to account for the 4 dBA pavement reduction. This Arizona Noise interface to STAMINA was used for this analysis and report.

The STAMINA 2.0/OPTIMA computer model has limitations as to the number of roadways, noise barriers and receivers that may be input into an individual model. Therefore, this project was broken into 4 segments for analysis purposes with some segments requiring more than one individual model.

In order to determine the noise produced by each roadway, the model requires traffic volumes, speed, grade adjustments and percentage of vehicle types. Vehicle types are defined as follows: cars (two axles and four wheels), medium trucks (two or three axles and six wheels) and heavy trucks (four or more axles and eight or more wheels). Each of these vehicles generates noise from different heights above the roadway.

The propagation path between noise sources and neighbors was modeled through the use of shielding factors and propagation constants. Shielding factors included rows of homes and steep terrain. Shielding factors were not applied to the neighbors in this study, as the neighbors are not protected by any of these types of existing structures. Propagation constants were used to reflect noise drop-off over distance. Drop-off rates used were 3 dBA per doubling of distance over hard surfaces such as asphalt, concrete or desert landscape and 4.5 dBA per doubling of distance for soft surfaces such as vegetated grass and tree areas. In the project area, as in most of Arizona, an assumption of hard ground was an appropriate model input.

STAMINA individually calculated the noise contribution from each roadway segment to each neighbor and then determined the cumulative effect of all roadway sources for each neighbor. Noise calculations were performed for each neighborhood in order to determine if noise mitigation was warranted. If the neighborhood exceeded ADOT's noise level criteria, they were modeled again with noise mitigation barriers. Noise barrier heights were iterated until the predicted noise levels fell below ADOT criteria levels. Noise barrier types include walls of varying heights, earth berms, and combinations of both. Noise walls were also combined with retaining walls in some locations.

The OPTIMA program is typically used to design cost-effective noise barriers in areas where STAMINA results indicate that noise impacts might occur.

Appendix C provides noise-monitoring results that were used to determine background noise levels that can be compared to the STAMINA noise prediction results. While the STAMINA 2.0/OPTIMA models have been calibrated and tested against actual noise measurements for several years, it should be noted that it is still a noise prediction model. Based on the assumptions stated in this report, STAMINA "predicts" noise levels along the project route for the design year 2025. Actual noise levels at that time may differ somewhat due to a number of factors including design changes in the highway, changes in traffic volumes and speeds, and different types of vehicles using the roadway.

2.4 Construction Noise Impacts

Construction noise differs from traffic noise in the following ways:

- Construction noise lasts for the duration of the construction time period
- Construction noise typically occurs only during daylight hours
- Construction activities are generally short term in nature
- Construction noise is often intermittent

To minimize noise impacts on the neighborhoods during construction, the following mitigation measures will be taken:

- Exhaust systems on equipment will be kept in good working order;
- Engine enclosures and intake silencers will be used where appropriate;
- Equipment will be maintained on a regular basis;
- New equipment will meet new noise emission standards;
- Stationary equipment will be located as far away from the neighborhoods as possible; and
- The public will be notified of construction operations.

3.0 NOISE ANALYSIS RESULTS

There were 102 neighbors modeled as part of this noise analysis. The neighbors were located along US60 and 202L, in neighborhoods around the project limits and represent similar noise characteristics for the surrounding homes. The neighbors consist of a school, condos and single-family residents (SFR). The type and location of each neighbor is shown in Tables 2A to 2L and in the Neighbor and Sound Wall Locations plans in Appendix B. Each neighbor site was chosen to represent an area of common outdoor use.

The initial scenario (No Mitigation, No ARAC) consists of predicting the design year traffic noise levels based on the existing noise barriers, berms and privacy walls at the traffic interchange. This modeling assumes the project will be constructed but there will be no new noise walls or ARAC quiet pavement. The results of this analysis are shown in the third column on Tables 2A to 2L.

The next scenario modeled the noise mitigation expected by the addition of ARAC. In general, ARAC achieves a 4 dBA sound level reduction and is a key component in the noise mitigation measures recommended in this report. The results of this analysis are shown in the 4^{th} column on Tables 2A to 2L.

The final modeling effort was to add noise barriers in appropriate areas to achieve a noise level of 63 dBA or less. The results of this analysis are shown in Tables 2A to 2L, column 5. The recommended noise mitigation to achieve these results is detailed in Table 4.

Mitigation was not achieved for three neighbors. N11 was a private school, qualifying for mitigation, at the beginning of this report but has changed function and is now a commercial development and no longer qualifies. N25c is within Augusta Casitas development. Sound walls 10 and 11 will be constructed within the project limits to provide partial mitigation to this neighbor. When US60 is widened east of Crismon Road, additional mitigation, which may include extending sound wall 11 over the Crismon Road bridge, will be required. Finally, mitigation for N6, which is an end row home, cannot be achieved and maintain local street access.

Table 3 presents a comparison between the 28 neighbors that were also modeled in the previous noise analysis by Entranco and the results presented in this report. The mitigated values are similar between the two studies.

Information on the eleven recommended sound walls is presented in Table 4. Over three hundred neighbors are benefited by the proposed mitigation. Sound Wall 6 will need to extend north in the Red Mountain Freeway University Drive to Southern Avenue project to provide mitigation. All of the walls achieve the goals of providing mitigation within the cost per benefited neighbor guideline.

Table 5 shows a comparison between the sound walls recommended in the 2001 noise report and those recommended in this final evaluation. Wall height and length changes are apparent and are due to the following factors:

- LOS C Year 2025 traffic volumes are higher than previously analyzed peak hour traffic
- The traffic speeds were increased to reflect Arizona driving conditions
- Earlier modeling may have used alpha and shielding factors
- Barriers, edge of ramps and existing privacy walls were coded in the current model
- Cross street traffic was included, as the proposed freeway is expected to substantially increase these volumes
- ADOT's Quiet Pavement program has been instituted

Plan sheets were developed to identify the locations of the neighbors and the horizontal alignment of the proposed walls as modeled, and are contained in Appendix C for reference purposes. The model results are included in Appendix D, Stamina Output Files, under separate cover.

The results of this analysis indicate that noise mitigation is required for the proposed freeway work. This mitigation will include the construction of eleven noise walls.

TABLE 2A
SRTTI
LOOP 202/US 60
Sound Wall 1 Neighbor Summary
dBA - LAeq1h

Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N1	SFR	68	64	63	1	4
N1A	SFR	70	66	63	3	6
N+2	SFR	80	76	63	13	6
N2A	SFR	79	75	62	13	7
N2B	SFR	79	75	62	13	6
N3	SFR	79	75	63	12	4
N3A	SFR	78	74	63	11	3
N4	SFR	73	69	61	8	4
N4A	SFR	72	68	63	5	6
N5	SFR	72	68	63	5	3
N6	SFR	72	68	67(1)	1	3

(1)No feasible mitigation available for this isolated end row neighbor.

TABLE 2B SRTTI LOOP 202/US 60 **Sound Wall 2 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N48	SFR	70	66	61	5	5
N48A	SFR	70	66	61	5	5
N49	SFR	70	66	62	4	4

TABLE 2C SRTTI LOOP 202/US 60 **Sound Wall 3 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N7	SFR	70	66	61	5	4
N7A	SFR	70	66	60	6	5
N7B	SFR	70	66	60	6	6
N8	SFR	66	62	N/A	**N/A**	4
N8A	SFR	67	63	N/A	**N/A**	6
N8B	SFR	68	64	59	5	5
N8C	SFR	68	64	59	5	5
N9	SFR	68	64	59	5	4
N9A	SFR	69	65	60	5	5
N9B	SFR	74	70	60	10	4
N9C	SFR	73	69	60	9	4
N10	SFR	70	66	61	6	3
N10A	SFR	67	63	N/A	**N/A**	4
N10B	SFR	64	60	N/A	**N/A**	6
N10C	SFR	63	59	N/A	**N/A**	3
N10D	SFR	63	59	N/A	**N/A**	3

TABLE 2D SRTTI LOOP 202/US 60 **Sound Wall 4 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N46g	SFR	66	62	N/A	N/A	4
N46h	SFR	67	63	N/A	N/A	5
N46I	SFR	69	65	63	2	5
N46J	SFR	69	65	63	2	5
N47	SFR	70	66	63	3	6
N47A	SFR	69	65	63	2	4
N47B	SFR	67	63	N/A	N/A	4

TABLE 2E SRTTI LOOP 202/US 60 **Sound Wall 5 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N46	SFR	69	65	63	2	9
N46a	SFR	67	63	N/A	N/A	6
N46a1	SFR	66	62	N/A	N/A	8
N46a2	SFR	67	63	N/A	N/A	8
N46b	SFR	66	62	N/A	N/A	7
N46b1	SFR	67	63	N/A	N/A	7
N46b2	SFR	67	63	N/A	N/A	5
N46c	SFR	64	60	N/A	N/A	5
N46c1	SFR	65	61	N/A	N/A	4
N46d	SFR	69	65	63	2	6
N46e	SFR	66	62	N/A	N/A	7
N46f	SFR	65	61	N/A	N/A	6

TABLE 2F SRTTI LOOP 202/US 60 **Sound Wall 6 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
CR1	SFR	71	66	61	5	2
CR2	SFR	71	65	60	5	3
CR3	SFR	71	67	62	5	3
CR4	SFR	71	67	61	6	3
CR5	SFR	68	63	N/A	N/A	3
N44	SFR	66	62	N/A	N/A	4
N45	SFR	68	63	N/A	N/A	3

TABLE 2G SRTTI LOOP 202/US 60 **Sound Wall 7 Neighbor Summary** dBA – Laeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N31C	SFR	67	63	N/A	N/A	4
N31D	SFR	68	64	62	2	3
N31E	SFR	69	65	62	3	3
N32	SFR	70	66	63	3	2

TABLE 2H SRTTI LOOP 202/US 60 **Sound Wall 8 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N29b	SFR	65	61	N/A	N/A	5
N29C	SFR	67	63	N/A	N/A	2
N29D	SFR	64	60	N/A	N/A	3
N29E	SFR	67	63	N/A	N/A	4
N29F	SFR	68	64	62	2	4
N30	SFR	68	64	62	2	4
N30A	SFR	67	63	N/A	N/A	3
N30B	SFR	66	62	N/A	N/A	3
N31	SFR	67	63	N/A	N/A	4
N31A	SFR	66	62	N/A	N/A	2
N31B	SFR	66	62	N/A	N/A	3
N32A	SFR	67	63	N/A	N/A	2

TABLE 2I SRTTI LOOP 202/US 60 **Sound Wall 9 Neighbor Summary** dBA – Laeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N26	SFR	67	63	N/A	N/A	1
N27	SFR	67	63	N/A	N/A	4
N27a	SFR	67	63	N/A	N/A	2
N27b	SFR	67	63	N/A	N/A	5
N27c	SFR	67	63	N/A	N/A	7
N27d	SFR	67	63	N/A	N/A	6
N28	SFR	68	64	63	1	6
N28a	SFR	68	64	63	1	7
N28b	SFR	68	64	63	1	5
N28c	SFR	69	65	63	2	6
N28d	SFR	69	65	63	2	5
N29	SFR	70	66	63	3	7
N29a	SFR	66	62	N/A	N/A	6
N29b	SFR	65	61	N/A	N/A	5

TABLE 2J SRTTI LOOP 202/US 60 **Sound Wall 10 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N21	SFR	72	68	63	5	5
N21A	SFR	70	66	63	3	6
N22	SFR	70	66	63	3	5
N22A	SFR	68	64	63	1	4
N23	SFR	69	65	62	3	5
N23a	SFR	71	67	63	4	5
N23b	SFR	66	62	N/A	N/A	5
N24	SFR	71	67	62	5	4
N24a	SFR	71	67	62	5	4

TABLE 2K SRTTI LOOP 202/US 60 **Sound Wall 11 Neighbor Summary** dBA - LAeq1h						
Neighbor	Neighbor Type	No Mitigation No ARAC	No Mitigation with ARAC	Mitigated with ARAC	Barrier Insertion Loss	# Units Represented
		Year 2025	Year 2025	Year 2025		
N25	SFR	71	67	63	4	3
N25a	SFR	70	66	63	3	5
N25b	SFR	72	68	63	5	4
N25c	SFR	73	69	68(1)	1	2

(1)

TABLE 3
SRTTI
LOOP 202/US 60
Neighbor Results Comparison
dBA - LAeq1h

Neighbor	Neighbor Type	Unmitigated 2001	Mitigated 2001	Unmitigated 2004	Mitigated 2004
		Year 2025	Year 2025	Year 2025	Year 2025
N1	SFR	76	63	68	63
N2	SFR	75	63	80	63
N3	SFR	74	63	79	63
N4	SFR	69	63	73	61
N5	SFR	72	62	72	63
N6	SFR	72	68	72	67
N7	SFR	71	61	70	61
N8	SFR	73	63	66	61
N9	SFR	68	63	68	59
N10	SFR	67	62	70	61
N11	School	64	63	71	**67**
N21	SFR	70	62	72	63
N22	SFR	69	61	70	63
N23	SFR	67	60	69	62
N24	SFR	69	63	71	62
N25	SFR	71	63	71	63
N26	SFR	70	63	67	62
N27	SFR	71	62	67	63
N28	SFR	65	60	68	59
N29	SFR	68	60	70	59
N30	SFR	63	-----	68	62
N31	SFR	64	60	67	61
N32	SFR	67	62	70	63
N44	SFR	61	-----	66	62
N45	SFR	64	63	68	63
N46	SFR	65	60	69	63
N47	SFR	64	59	70	63
N48	SFR	68	63	70	63
N49	SFR	70	63	70	63
N53	SFR	65	62	69	65

Table 4
SRTTI
LOOP 202/US 60 T.I.
WALL DESIGN SUMMARY SHEET
dBA - LAeq1h

Barrier Description	New Barrier Height (ft.)	Area of New Barrier (sq. ft.)	Total Barrier Cost	Neighbors Impacted by Barrier	Neighbors Benefited	Total # of Units Benefited	Cost per Benefited Neighbor
Sound Wall on retaining wall at Sta 38+15 to 884+75	8 to 12	36,850	$663,300	1, 1A, 2, 2A, 2B, 3, 3A, 4, 4A, 5, 6	1, 1A, 2, 2A, 2B, 3, 3A, 4, 4A, 5	51	$13,006
Sound Wall on north side Sossaman WB off ramp Sta 918+65 to 931+09	10 to 12	19,002	$342,036	48, 48A, 49	48, 48A, 49	14	$24,431
Sound Wall on North edge of Ramp N-W Sta 944+02 to 21+04	9 to 13	12,364	$222,552	46, 46A2, 46D, 46E, 46F	46, 46A2, 46D, 46E, 46F	36	$6,182
Sound Wall on north edge of Ramp S-W Sta 27+76 to 21+04	10 to 12	16441	$295,938	46G, 46H, 46I, 46J, 47, 47A, 47B	46G, 46H, 46I, 46J, 47, 47A, 47B	33	$8,968
Sound Wall at right of way at Sta 919+05 to 961+06	10 to 15	56,328	$1,013,904	7, 7A, 7B, 8B, 8C, 9, 9A, 9B, 9C, 10	7, 7A, 7B, 8B, 8C, 9, 9A, 9B, 9C, 10	45	$22,531
Sound Wall outside Ramp S-E Sta 16+64 to Sta 420+00	10	4,960	$99,200	CR1, CR2, CR3, CR4, CR5, 44, 45	CR1, CR2, CR3, CR4	11	$9,018
Sound Wall outside Ramp W-N Sta 19+26 to 27+00	12	11,200	$201,600	28D, 29, 29A, 29B	28D, 29	12	$16,800
Sound Wall outside Ramp E-N Sta 422+06 to Sta 19+02	10	4,800	$86,400	29F, 30, 31D, 31E, 32	29F, 30, 31D, 31E, 32	16	$5,400
Sound Wall replace privacy wall Sta 990+75 to Sta 1023+09	6 to 10	23,500	$423,000	26, 27, 27A, 27B, 27C, 27D, 28, 28A, 28B, 28C	28, 28A, 28B, 28C	29	$14,586
Sound Wall along right of way at Sta 1029+41 to 1065+00	8 to 14	73,875	$1,329,750	21, 21A, 22, 22A, 23, 23A, 23B, 24, 24A	21, 21A, 22, 22A, 23, 23A, 23B, 24, 24A	43	$30,924
Sound Wall south edge of US60 at Sta 1065+00 to 1084+00	12	17,800	$320,400	25, 25A, 25B, 25C	25, 25A, 25B	14	$22,886

Table 5

SRTTI

LOOP 202/US 60 T.I.

WALL DESIGN COMPARISON

dBA - LAeq1h

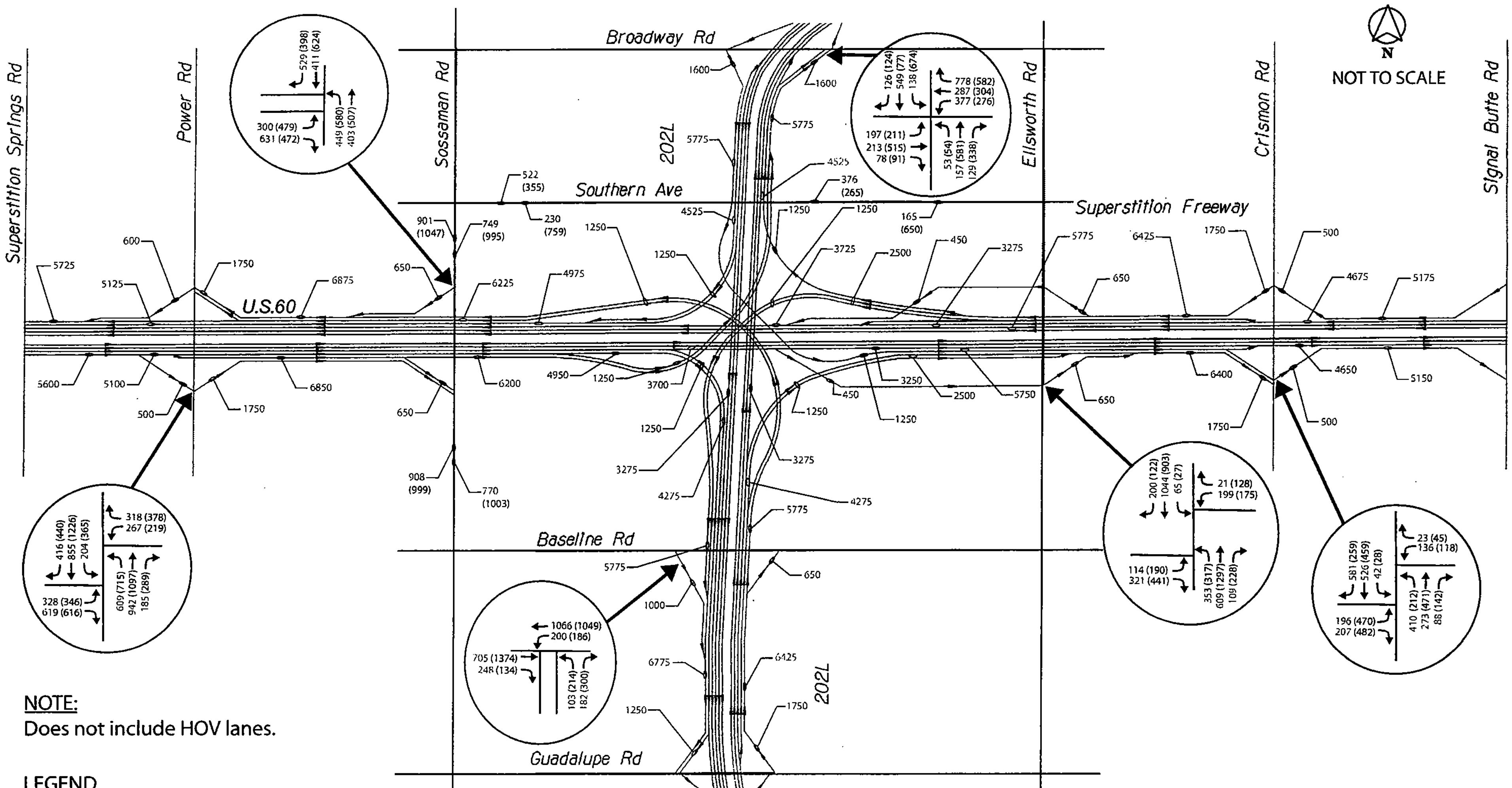
2001 Barrier	Barrier Height (ft.)	2004 Barrier	New Barrier Height (ft.)	Description
Barrier B25	10 to 18	Sound Wall 1	8 to 12	
Barrier B10	16	Sound Wall 2	10 to 12	
Barrier B12	10	Sound Wall 3	9 to 13	
Barrier B13	8 to 14	Sound Wall 4	10 to 12	2004 shorter length
Barrier B7 & B6	12 to 14 & 10	Sound Wall 5	10 to 15	2004 no equivalent for B6 needed
Barrier B14	6 to 10	Sound Wall 6	10	2004 shorter length
Barrier B1 & B18	6 to 10 & 12	Sound Wall 7	12	2004 shorter length and no equivalent for B18 needed
		Sound Wall 8	10	2001 no equivalent barrier
Barrier B20	12 to 16	Sound Wall 9	6 to 10	2004 shorter length
Barrier B23	10 to 12	Sound Wall 10	8 to 14	2004 shorter length
Barrier B24	14	Sound Wall 11	12	
Barrier B5	10			2004 no equivalent needed

APPENDIX A

Future (2025) Traffic Volumes

APPENDIX B

Neighborhoods and Sound Walls



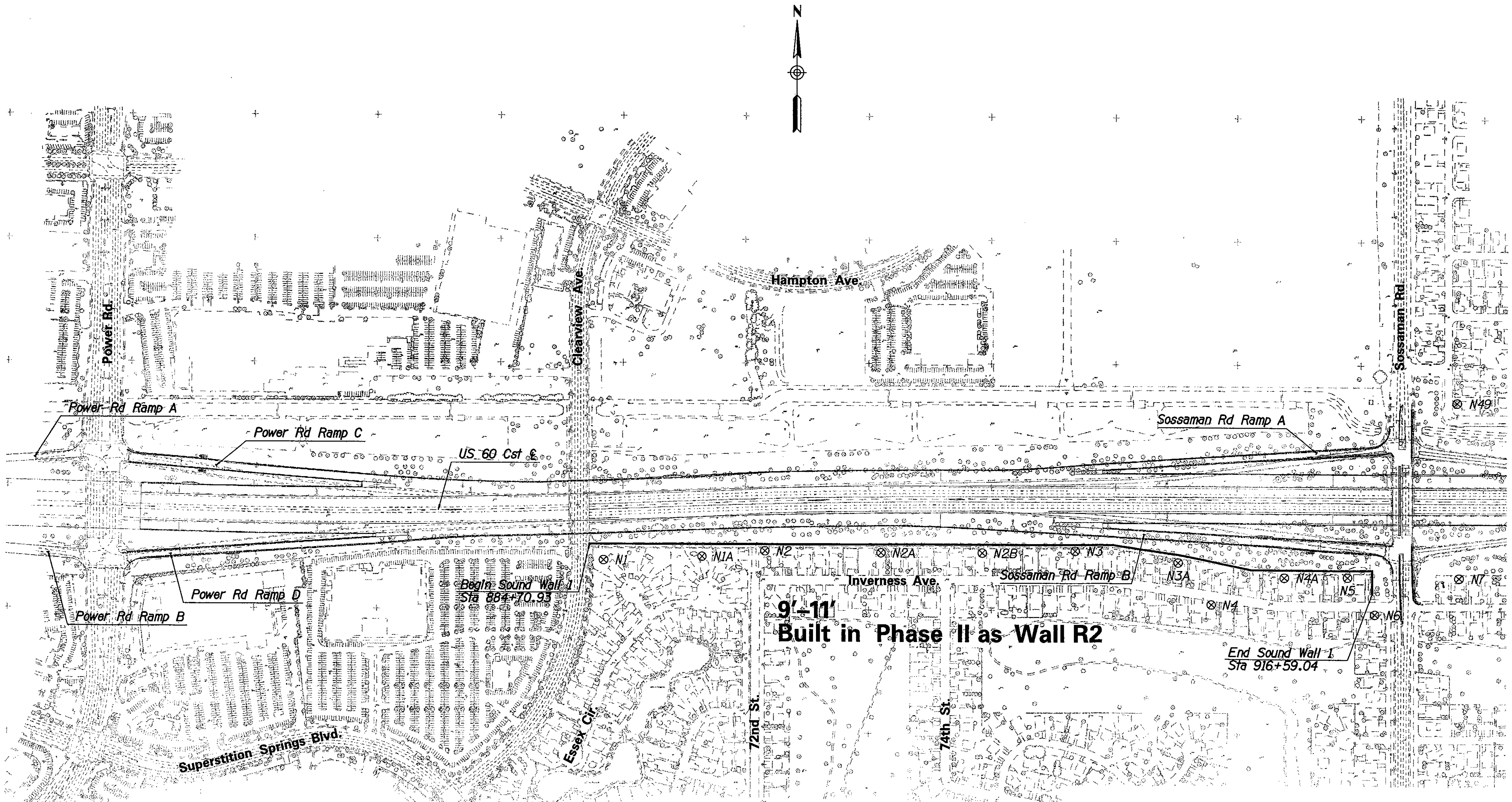
NOTE:
Does not include HOV lanes.

LEGEND
XXX - 2025 AM Peak Hour
(XXX) - 2025 PM Peak Hour
XXX - Level of Service (LOS) C Traffic Volumes

TRAFFIC VOLUMES

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B			

202 MA 029



Wall Plan
Scale 1" = 400'

⊗ = Neighbor
—— = Sound Wall

	NAME	DATE
DESIGN	KKK	06/04
DRAWN	AFA	06/04
CHECKED	SC	06/04

AZTEC — 4561 E. McDowell Road, Phoenix, AZ 85008-4505, Tel (602) 454-0402, Fax (602) 454-0403, www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEIGHBOR
AND
SOUND WALL LOCATIONS

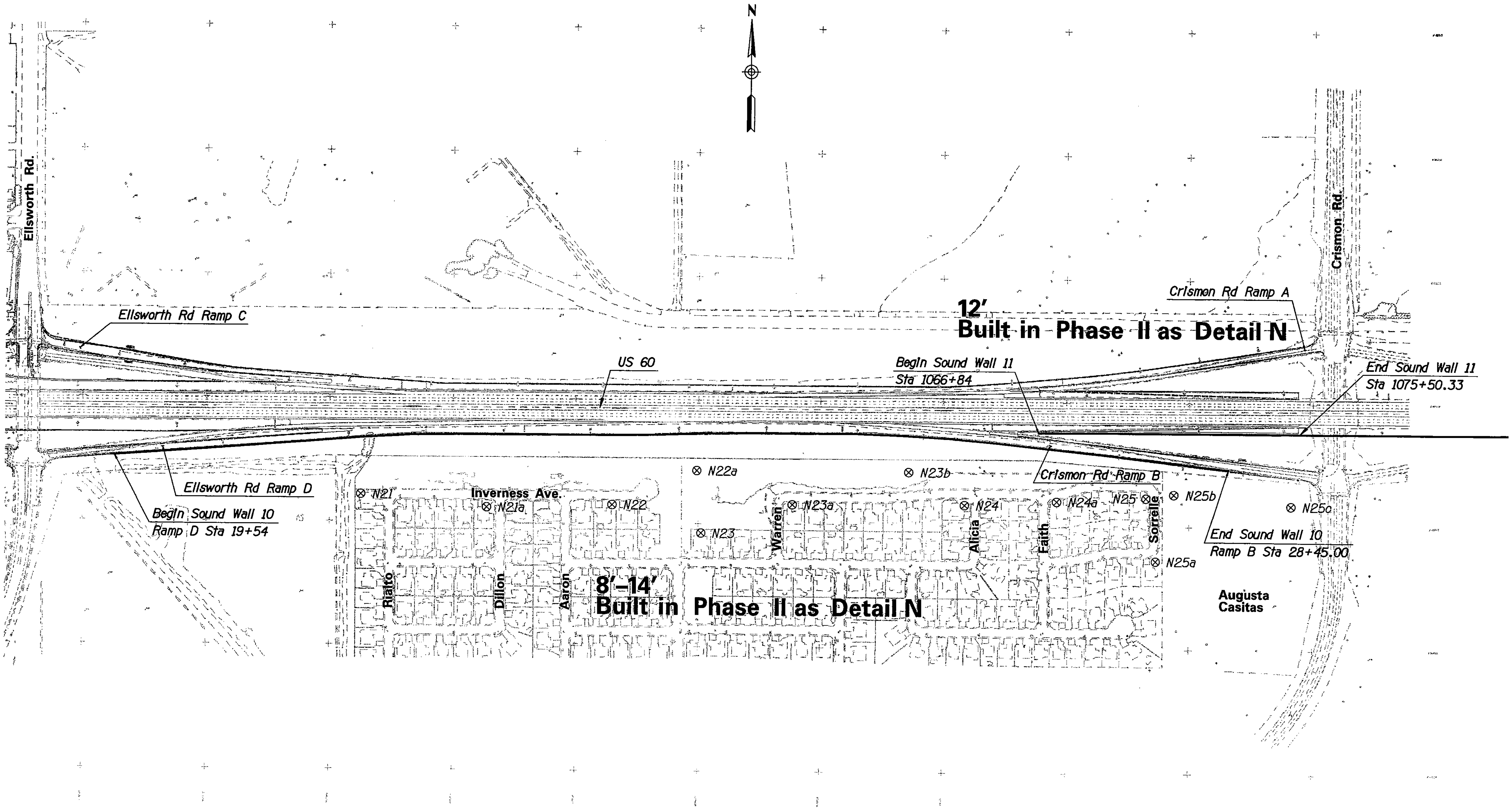
NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION LOOP 202/US 60 T.I. | Sheet 1 of 4

TRACS NO. H5686 04C | 202-B(008)B | B-2

Plotted By: schamberlain 02:54:33 PM 11/03/2004 R:\Phoenix\Projects\Az01107\Cadd\Noise\02\az01107-02-01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B			
		202 MA 029			



Wall Plan
Scale 1″=400′

⊗ = Neighbor
—— = Sound Wall

	NAME	DATE
DESIGN	KKK	06/04
DRAWN	AFA	06/04
CHECKED	SC	06/04

AZTEC — 4561 E. McDowell Road, Phoenix, AZ 85008-4505, Tel (602) 454-0402, Fax (602) 454-0403, www.azteca.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEIGHBOR
AND
SOUND WALL LOCATIONS

NOT FOR CONSTRUCTION OR RECORDING

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Sheet 4 of 4

TRACS NO. H5686 04C | 202-B(008)B | B-5

APPENDIX C

Noise Monitoring Results

TABLE 6
SRTTI
LOOP 202/US 60
Neighbor Monitoring Comparison
dBA - LAeq1h

Neighbor	Neighbor Type	Sound Level Monitored	Sound Level No Mitigation	Arithmetic Increase
		Year 2000	Year 2025	
10	SFR	65	70	5
11	SFR	65	71	6
30	SFR	57	68	11
46	SFR	64	69	5
48	SFR	65	70	5